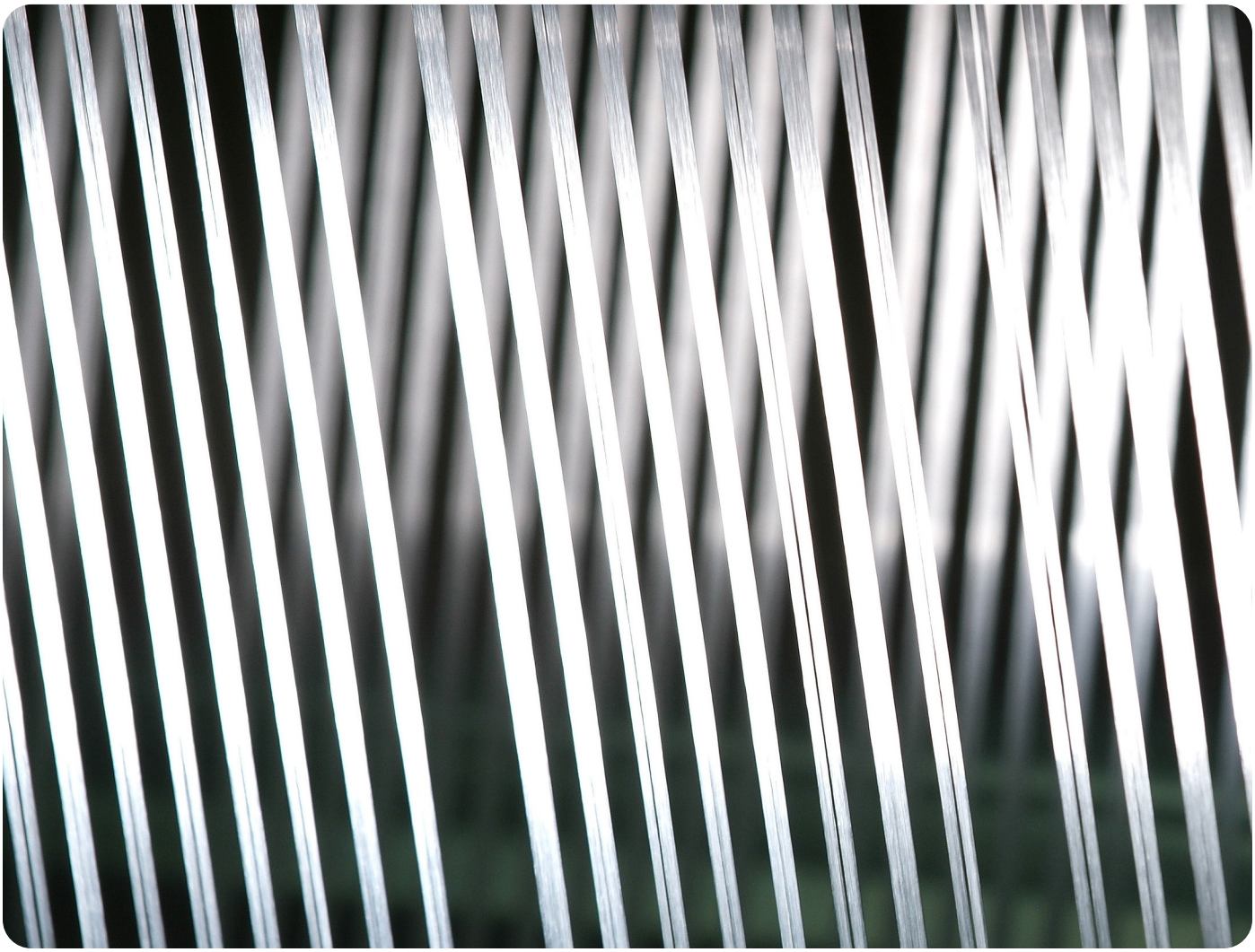
Solstice

SPECTRA® FIBER CAPABILITY GUIDE



SPECTRA® FIBER: LIGHTWEIGHT STRENGTH

From performance ropes that lower critical equipment to the sea floor, to cut-resistant gloves and high-performance fishing line, Spectra fiber has been providing lightweight, dependable strength in demanding applications for more than 20 years. Spectra fiber is one of the world's strongest and lightest fibers available today, and we are committed to continuous in-house materials development.

Spectra Fiber is at work on some of the world's toughest projects:

- Slings made with Spectra fiber were used to lift 2.6 million-pound sections of the San Francisco-Oakland Bay Bridge
- Spectra fiber is trusted by sport fishing's leading professional anglers, where the performance and durability of the fiber helps them succeed in the biggest tournaments
- Storm curtains made with Spectra fiber are certified to withstand winds of up to 175 miles per hour, the equivalent of a Category 5 hurricane
- The U.S. military uses high-strength rope made with Spectra fiber on the V-22 Osprey tilt-rotor aircraft for fast rope insertion operations
- Vehicle barriers made with Spectra fiber are used extensively to protect military checkpoints in Iraq and Afghanistan

PRODUCT PORTFOLIO

Spectra Fiber is made from ultra-high-molecular weight polyethylene using a patented gel-spinning process. With a range of deniers available from 20 to 5600, Spectra fiber is engineered for a wide variety of applications, including:

Rope and Cordage: rope, industrial and aquaculture netting, slings and tethers

Recreation: fishing lines, bow strings, parachute cords, racket strings, backpacks, climbing ropes, and sail cloth

Cut Resistance: gloves, aprons, sleeves and sporting apparel

Specialty Applications: space materials, dental floss, security barriers and storm protection

THE BENEFITS OF SPECTRA FIBER

- 15 times stronger than steel by weight
- Light enough to float (.97 g/cc specific gravity)
- Hydrophobic
- Does not corrode
- Excellent abrasion resistance
- Excellent flex and bending fatigue performance
- Very good UV resistance
- Excellent cut resistance
- Excellent fungal growth resistance
- Low dielectric constant makes it virtually transparent to radar
- Low coefficient of friction

AVAILABLE DENIERS BY PRODUCT

Denier	20	30	50	100	150	200	215	375	400	435	650	800	1200	1300	1600	2400	4800	5600
Decitex	22	33	56	111	167	222	239	417	444	483	722	889	1333	1444	1778	2667	5333	6222
Breaking Strength (lbs)	1.9	2.8	4.5	8.8	12.5	17	18.5	32.7	33.5	37.4	51.6	63.5	92.6	103.2	130.5	190.5	338.6	395.1

FIBER CAPABILITIES

Lightweight Strength

Used in military and police armor applications around the world, Spectra fiber is 15 times stronger than steel yet light enough to float. It is more durable than comparable polyester fiber, and is more than 40 percent stronger than aramid fiber.

Durability

Spectra fiber is used in a diverse array of applications where durability is a necessity, from rope and sail cloth to netting and security barriers. Thanks to its larger filament diameter, Spectra fiber performs well in internal friction and hex bar testing. It exhibits excellent flex fatigue and abrasion resistance, and is highly cut-resistant. The fiber features excellent damping characteristics for vibration, shock and impact, and has a low dielectric coefficient and loss tangent.

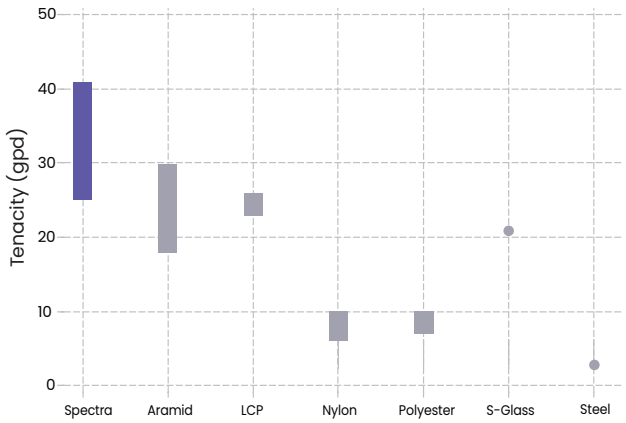
Chemical, Fungal, and UV Resistance

Spectra fiber exhibits high resistance to many types of substances, from seawater to sulfuric acid. In outdoor applications, its resistance to fungal growth, corrosion, and ultraviolet light makes it suitable for the harshest of climates.

FIBER COMPARISON

Material	Density (g/cc)	Tenacity (gpd)	Elongation (%)	Modulus (gpd)
Spectra S-1000	0.97	34-41	3.8	1130-1650
Aramid	1.44	18-30	3.3-5.6	450-1110
LCP	1.40	23-26	3.3	525+
Steel	7.80	3	1.3	300
S-Glass	2.50	21	5.7	400
Polyester	1.38	7-10	10-15	80-120
Nylon	1.14	6-10	15-28	<80

COMPETITIVE FIBER TENACITY



THE STRENGTH OF SPECTRA

With support in every region of the world, our sales and customer service capabilities are never far away. Plus, Spectra continues to invest in advanced product research and applications technology capabilities to develop next-generation fiber solutions for our customers.

For more information, visit
www.solstice.com/us/en/products/spectra-fibers

THERMAL PROPERTIES

Melting range	144-152°C
Decomposition temperature	> 300°C
Advised lowest temperature	No limit
Advised longest duration temperature limit	70°C
Advised short duration temperature limit (non-constrained fiber)	130°C
Advised short duration temperature limit (constrained fiber)	145°C

CHEMICAL RESISTANCE

SUBSTANCE	STRENGTH RETENTION
Seawater	Excellent*
Hydraulic fluid	Excellent*
Kerosene	Excellent*
10% detergent solution	Excellent*
Gasoline	Excellent*
Toulene	Excellent*
Glacial acetic acid	Excellent*
1M hydrochloric acid	Excellent*
5M sodium hydroxide	Excellent*
Ammonium hydroxide (29%)	Excellent*
Perchloroethylene	Excellent*
Bleach	Excellent*
Hypophosphite solution (10%)	Excellent*
Nitric acid (50% by volume)	Excellent*
Sulfuric acid (50% by volume)	Excellent*
Phosphoric acid (50% by volume)	Excellent*

** Fiber retains more than 90 percent of strength after immersion in substance for six months*

TENSILE STRENGTH OF FIBER RELATIVE TO 23°C

Temperature	-60°C	+23°C	+60°C	+100°C
Tensile Strength	110%	100%	80%	55%

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For More Information Visit
https://www.solstice.com/us/en/applications/spectra-industrial

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